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Title:
CPATH EAE: Extending Contextualized Computing in Multiple Institutions Using Threads

Project Participants

Senior Personnel

Name: Isbell, Charles
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Furst, Merrick
Worked for more than 160 Hours: No
Contribution to Project:

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Worked for more than 160 Hours: Yes
Contribution to Project:
Maureen has left the university and is no longer affiliated with this project

Name: Auerbach, Jill
Worked for more than 160 Hours: Yes
Contribution to Project:

Name: Stallworth, Cedric
Worked for more than 160 Hours: Yes
Contribution to Project:

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Worked for more than 160 Hours: Yes
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Assessment Coordinator

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Contribution to Project:

Undergraduate Student

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Other Participant

Research Experience for Undergraduates

Organizational Partners

Other Collaborators or Contacts

The School of Literature Media and Communication at Georgia Tech has implemented the Threads model for two of their degrees. The first degree is for Computational Media, a joint degree with the College of Computing. The faculty have created four non-Computing threads to combine with Computing threads and the various School and College curriculum committees have voted to approve them. The new curriculum has gone into effect. In addition, LMC has created a separate threads curriculum for their own internal undergraduate degree. Those changes should take effect next academic year.

Activities and Findings

Research and Education Activities:

The basic focus of this project was to develop and understand further the threads model of computing curricula and education. The Threads model represents a natural evolution of contextualized computing education, extending the application of that idea to an entire undergraduate computing degree. Threads represents both a process for understanding and developing curricula, and a set of outcomes derived from the application of that process.

To that end, we pursued two major thrusts. The first was to document and develop the evolution of Threads at the College of Computing at Georgia Tech, where it was first developed and implemented. The second was to apply the Threads process at a set of diverse institutions and to examine how the outcomes differ on each campus.

At Georgia Tech, we have focused on the necessary adaptation of our curriculum, but also on developing the infrastructure for intentional advising, as well as the development of robust software support for administrators, advisors, educators, and students. As chair of the undergraduate curriculum committee over the last several years, I have been in a position to focus on the changes to our first iterations of the threads curriculum. Around the time of this grant was awarded I was appointed Associate Dean for Undergraduate Affairs and Director of Academic Administration, and later Associate Dean of Academic Affairs then Senior Associate Dean, so I have been able to focus on the broader issues of integrating intentional advising and supervising our software infrastructure.

In working with our partner institutions, we continued the process of transferring our experiences to their departments and using their own individual experiences to guide our own development at Tech. We had four strategic goals for this partnership: (1) To foster among partnering institutions an understanding of the process by which the Threads concept evolved and successfully changed computing curriculum at Georgia Tech; (2) To develop systematic ways to share ideas and to coach partners over the next 3 years as they attempt to tailor this process to their own unique settings; (3) In tandem with the first year, GT will continue to develop tools and advising processes to best support Threads at GT for adaptation at partnering institutions; and (4) To disseminate our results, experiences, software support infrastructure, and development process, and assessment tools to the larger computing community.

In the first year, we ran a workshop where all the partners met, shared experiences, and proposed processes for going forward in each of the departments. A number of issues were raised and we developed plans for dealing with each. We have begun building

materials and a web site for documenting our progress and insights. We plan to provide lessons learned, software, and several examples of Threads-based computing degrees. The GT Global Office will also include site visits, phone coaching as needed, sharing supporting tools and best practices; and on-going creative problem solving with and among partners in support of successful Threads adaptation.

In the second year, we continued this process, running smaller workshops and involving external audiences to participate. We planned in year three for this to culminate in a larger workshop effort with formal invitations for schools that we have identified who have expressed interest.

What actually happened in the third year is that we did run a larger workshop, inviting a number of department heads and change agents from a variety of universities. Although we talked about Threads and some of the issues that arose in our various implementations, we chose to focus more strongly on the process of initiating and sustaining radical curricular reform than we had originally intended. To that end we worked closely with Dr. Lynn Stein, who also has a CPATH grant. That meeting was a success and I continue to visit departments to talk more about Threads itself. At the same time, we have developed material for explaining threads to young students and integrated those in our outreach efforts.

An overarching theme forour thrusts is assessment. Coincidently, Georgia Tech was up for ABET accreditation in 2009, and so we took that opportunity and our mission for the CPATH grant as a way to leverage resources to focus on developing comprehensive assessment tools. The hope was that as a consequence GT would have a very robust assessment plan that includes not only outcomes from the courses we offer, but also ways to understand how threads has or has not improved the educational experiences for our students and how well our out-of-band efforts at advising affect them. ABET accreditation was successful and we now have a report that captures how threads students differ in their attitudes about computing from pre-Threads students.

This is all to the good, and represents on the most frequently raised issues by both our partner institutions and external audiences. To this end, Elijah Cameron joined our efforts in the second year and spends some time on helping us with assessment. We have developed a formal assessment plan for the curriculum and are implementing it. Now that we have enough time invested in this project, we have been able to also leverage our institutional research office. They have created new reports for us, demonstrating the changes in enrollment and demographics as the threads efforts have expanded and have agreed to track our progress institutionally.

As noted above, we have come to appreciate that one very useful way to think about the Threads model is as a mechanism for institutionalized advisement for students. In the second year, we really stepped up our intentional advising efforts, and have created a peer-mentoring program. We built assessment into this process, overseen by Cedric Stallworth and Elijah Cameron. The program has continued. We have developed a white paper that outlines our intentional advising efforts. We have begun small pilot efforts and are now in the process of restructuring common parts of the curriculum to better formalize this advising. Finally, we have begun the process of hiring a permanent, professional intentional advisor.

It is also worth mentioning that our assessment effort is also meant to assess (1) how effectively we communicate to our partners through the process of moving from their traditional curriculum to using the notion of Threads; (2) the extent to which the process is actually transferred successfully among partners; and (3) the extent to which the developed supports for Threads are adapted for use by the partners. Initial results are available as a part of the assessment document.

Findings:

At Georgia Tech, we have moved through several iterations on our curriculum in time for our first set of graduates under threads; begun testing on Threadspace, our advising tool for students and administrators, and determining what is feasible and necessary to support administrative needs as well as student needs; developed an assessment plan, including accreditation; and moved forward in developing and implementing our intentional advising efforts. In addition to creating an Assistant Dean of Community position that will focus on the non-curricular issues involved with this grant, we have been able to hire a dedicated assessment coordinator. We have also been able to work closely with the institute assessment officers and the institute research office. Some of these efforts are partially supported by this grant directly.

Our partner institutions are in various stages of adapting Threads locally. We have worked closely with them and expect two of them to move in the next year to implement their own programs.

The PI at Brooklyn College has developed a proposal for the faculty and is moving forward. SPSU has generated a complete and robust proposal for three threads at SPSU: Security, eDevice, and Intelligent Scientific Computing Thread, including initial lists of objectives and outcomes for program assessment, and is moving its plan through the university process.

At Kennesaw, the PIs have moved beyond the initial stages of discussion with faculty. The faculty has agreed to move forward. Kennesaw has also taken a lead in sharing these efforts with the IT and IS communities rather than the CS community, which has been Georgia Tech's focus. More recently, changes in her local institution has made it more likely that the faculty will adopt Threads in the fourth year.

At, AASU Dr. Saad has started project-related discussions among the eight faculty of his department on his work on this CPATH project, and started briefing them on his project-activities as well as familiarizing them with the Threads model that is already in existence at GT's CoC.

As a result of our workshops we have generated interest in other departments. As PI, Charles Isbell has visited several departments in the last year and will continue these efforts beyond the life of the grant.

As we have learned as a part of this program, the major obstacles to implementing threads end up being political rather than intellectual. Those departments with strong administrative support and impetus as well as a faculty champion tend to adopt, adapt, and implement threads fairly quickly. Those that either do not have such support and encouragement tend not to do so.

Events have overtaken the development of a separate threadspace tool at Georgia Tech. A new third party system was bought by the Institute that supports most of the functionality of threadspace, so we have worked closely with the Registrar's office to make sure that the system works well with the threads model. It has proven excellent so far, though it turns out that the threads model works in a way that is different from the usual use case. For example, in threads 'double dipping' for satisfying requirements across multiple threads is allowed while that is not typically the case. Luckily, the modular and conceptually independent nature of the threads means that the system handles these differences just fine.

Finally, as noted elsewhere, The School of Literature Media and Communication at Georgia Tech has implemented the threads model for two of their degrees, including the joint degree they share with Computing. The belief that interdisciplinary degrees could be created with less overhead appears to be valid.

Training and Development:

The project has mainly engaged a number of the participants in assessment for larger curricula. In particular, I have developed research experience on assessment in general and assessing curricula and student impact. Further, some students have been directly engaged in both developing survey and assessment tools and in advising undergraduates.

In the last years we engaged a graduate research assistant to help us with student-facing surveys and to do research towards her thesis on identity and education.

Outreach Activities:

Conveying the diversity and wide applicability of computing to the public was one of the major reasons for developing Threads in the first place, and this grant has enabled us to begin the process of developing the kinds of rigorous assessment that is necessary to convey that to our colleagues at other departments as well.

Further, I have continued to talk with high school students about Threads-like curricula. What we have learned has now been institutionalized as a part of our outreach. In working with my CPATH colleagues, I have also been able understand how to apply Threads-like models to non-CS fields. In addition to our efforts in IT and IS--still Computing fields, if not CS--the faculty at Georgia Tech's School for Literature, Media and Communication have converted their degrees to Threads.

Journal Publications

Books or Other One-time Publications

Web/Internet Site

Other Specific Products

Contributions

Contributions within Discipline:

In the first year of this project, the major contributions of this work was in conveying this way of building computing curricula to CS and Engineering educators. In the second year, the major contributions were in: (1) expanding those beyond the traditional CS educators and (2) in implementing assessment mechanisms for threads. In the out years, the major contributions have been in gathering data, demonstrating trends and developing mechanisms for dissemination as well as institutionalizing what we have learned.

We have completed our assessment of threads and will begin publishing that data via conferences and journals.

Contributions to Other Disciplines:

As noted elsewhere, we have been focused on computing; however, the School of Literature, Media and Culture at Georgia Tech, has developed a threaded curriculum. The shared KMC-CoC degree will now be constructed as pairs of threads from each unit. Earlier in this project, the PI has chaired a Provost-level committee on understanding how a threaded curriculum could be applied to all of Georgia Tech and in the last year and a half continued exploring how these ideas would work within the new strategic plan.

Contributions to Human Resource Development:

There is some early evidence that developing the support mechanisms for Threads is having some impact on retention and recruitment for computing students, particularly for underrepresented groups. We focused specifically on this in the recently, including exploring a research project on how threads interacts with identity as well as using institute resources to gather data. Our assessment report contains what we have been able to show, though as always it is difficult to demonstrate causality.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Conference Proceedings

Categories for which nothing is reported:

Organizational Partners
Any Journal
Any Book
Any Web/Internet Site
Any Product
Contributions: To Any Resources for Research and Education
Contributions: To Any Beyond Science and Engineering
Any Conference